COLORADO RIVER RECOVERY PROGRAM Project #: 105
FY-2002 PROPOSED SCOPE OF WORK

Lead Agency: Fish and Wildlife Service
Colorado River Fishery Project

Submitted by: Frank K. Pfeifer, Project Leader
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Category:
X Ongoing project
_ Ongoing-revised project
_ Requested new project
_ Unsolicited proposal

Expected Funding Source:
X Annual funds
_ Capital funds
_ Other (explain)

I. Title of Proposal: **Evaluation of Stocking Sub-adult Colorado pikeminnow via Translocation in the Upper Colorado River between Palisade and Rifle, Colorado**

II. Relationship to RIPRAP:

Colorado River Action Plan: Mainstem

IV.A.	Augment or restore populations as needed and as guided by the Genetics Management Plan.
IV.A.1.	Razorback sucker.
IV.A.1.b.	Implement experimental stocking plan.
IV. A. 1.b.(2)	Monitor and evaluate results; make recommendations regarding further augmentation.

Colorado River Action Plan: Gunnison River

IV.A.	Augment or restore populations as needed and as guided by the Genetics Management Plan.
IV.A.1.	Razorback sucker.
IV.A.1.b.	Implement experimental stocking plan.
IV. A. 1.b.(2)	Monitor and evaluate results; make recommendations regarding further augmentation.

III. Study Background/Rationale and Hypotheses:

The Palisade to Rifle reach of the Upper Colorado River is historical habitat for both Colorado pikeminnow and razorback sucker, and Anderson (1997) recommended that appropriate habitat was available for reintroduction of these two fishes. Burdick (1992) proposed stocking razorback sucker in the Palisade to Rifle reach of the Upper Colorado River. As a result, twenty, sub-adult and adult razorback sucker, captured from Etter Pond, were implanted with radio tags and stocked into the Upper Colorado River in this stream reach in the spring of 1994 (Burdick and Bonar 1997). A later stocking plan (Burdick et al. 1995) proposed stocking large numbers of 4-, 8-, 12-inch razorback sucker into the Upper Colorado River. In 1999, 3,498 juvenile (mean total length=172 mm; range total length=106-310 mm) razorback suckers were released on five different dates between 20 September and 29 October in the Upper Colorado River, at river mile 227. Between April and November 2000, 14,414 hatchery- and pond-reared juvenile razorback sucker were stocked in the Upper Colorado River near Parachute.

Colorado pikeminnow are thought to have occupied the stream reach upstream of Government Highline Diversion Dam; historical accounts and records of Colorado pikeminnow upstream of Palisade are scant. The last and only record is from an anecdotal account of the capture, by angling, of a 15-inch Colorado pikeminnow, above Glenwood Springs (Pressey 1968 [in Nesler 1998]). In the early 1960's, fishermen reported catching Colorado pikeminnow in Plateau Creek (personal communication, George Kidd; Kidd 1974). Investigators conducting fishery surveys in warmwater reaches of Plateau Creek from the mouth upstream did not report collecting any razorback sucker or Colorado pikeminnow (Carlson and Platania 1984; Wick and Hawkins 1983). Plateau Creek is a small tributary to the Colorado River; the confluence being approximately 0.4 miles downstream from Government Highline Diversion Dam. The last wild adult razorback suckers captured in a riverine environment upstream of Government Highline Diversion Dam was in 1981 at a river mile 220.7 and 223.5 near Parachute, Colorado (Valdez et al. 1982). One adult razorback sucker was collected in 1991 from an isolated pond (river mile 234.8) downstream of Rifle, Colorado. Since 1991, over 100 sub-adult and adult razorback sucker were collected from Etter Pond (river mile 204.5), a human-made gravel pit, immediately downstream Debeque, Colorado.

The State of Colorado finalized an aggressive 5-year stocking plan throughout the state's waters and recommended razorback sucker and Colorado pikeminnow be stocked in the Upper Colorado River from Rifle to Debeque Canyon (Nesler 1998). The goal of Colorado's stocking plan is to establish 475 razorback sucker/river mile and 10 Colorado pikeminnow/river mile to repatriate this species in the Rifle to Debeque Canyon stream reach. Stocking wild and hatchery-reared sub-adult and/or young adult Colorado pikeminnow from downstream stream reaches of the Upper Colorado River via translocation proposed in this SOW may provide useful information on residency, movement within the stocked reach, and possible downstream migration over the Grand Valley Water User's (Government Highline) Diversion Dam (river mile 193.7). Large

sub-adult (420-450 mm) and young adult (450 mm-550 mm) Colorado pikeminnow have shown to exhibit greater upstream dispersal distances (mean of 33.6 km upstream) than larger (greater than 550 mm; mean 7.5 km) pikeminnow in the Upper Colorado River (Osmundson et al. 1998. Several hypotheses (see Osmundson et al. 1998) have been offered for the upstream movements by smaller pikeminnow: 1) a response to food resource gradients, i.e., movements may be motivated by hunger, 2) an innate physiological mechanism to move upstream, and 3) the urge to spawn, and better foraging areas are discovered in the process. Colorado pikeminnow less than 550 mm may not have established a home range like that of their larger counterparts. Their inclination to move long distances upstream as they mature may make them candidates to naturally colonize upstream reaches.

Fish passage is being pursued by the Recovery Program at the Government Highline Diversion Dam and the Price-Stubb Dam (river mile 188.3) on the Upper Colorado River. Pre-construction phase completion for fish passage at Government Highline is scheduled for FY2001; completion of the project is scheduled sometime during FY2002. At Price-Stubb dam, the two options being considered are removal of the dam and constructing a fish passage if the dam is left in intact. Regardless of the alternative selected, removal or construction of a fish passage facility is tentatively scheduled to start in July 2000. If fish passage at Government Highline is not established by FY2002, then radio transmitters implanted in Colorado pikeminnow during the second year of the study may not still be active. Therefore, preliminary information on the use of this fish passageway by these radiotagged fish will probably not be collected.

It is uncertain if Colorado pikeminnow, whether those that are translocated and stocked upstream of Government Highline Diversion Dam or those that might move upstream from downstream reaches through the fish passageway at this diversion dam, will remain and spawn upstream in the reach between Rifle and the diversion dam. Or will translocated pikeminnow move downstream prior to spawning, spawn somewhere downstream, and then return upstream using the fish passageway provided them at the various diversion dams? The reach upstream of Palisade is on the fringe of the species range. And, although Anderson (1997) recommended that there was appropriate habitat and available native forage for reintroduction of pikeminnow, it is unknown whether warm enough water temperatures exist upstream of Government Highline for pikeminnow to remain. And if so, will this limit Colorado pikeminnow spawning or their upstream distribution? On the contrary, if pikeminnow stay and do spawn, then stocking fish in this reach may not be necessary. The translocation of large sub-adult and young adult Colorado pikeminnow will hopefully provide some initial answers to these questions, assist in determining if further Colorado pikeminnow stocking is needed, and help direct other management activities for this reach.

Study Results to Date

Radio tracking (2000)

1. The spatial and temporal movements of 10 radiotagged sub-adult Colorado pikeminnow were monitored by tracking fish from boats and from one semi-permanent, land-based tracking station located on the Upper Colorado River. The land-based station is located at RM 192.3 (Island Acres State Park), 1.4 miles downstream from Government Highline Diversion Dam. Limited tracking by boat was conducted in mid- and late-July, early-August, and mid-November. No boat tracking was conducted in September or October. The Rifle (RM 241) to Government Highline Diversion Dam (RM 193.7) reach, the 15- and 18-mile reaches, and lower 3 miles of the Gunnison River were tracked by boat in July and August. The river reaches searched by boat for 2 days in November were Hoaglund Landing (RM 227.6) to Government Highline Diversion Dam and Grand Valley Irrigation Diversion (RM 185.3) to Corn Lake (RM 177.4). The reach between Government Highline Dam and Grand Valley Diversion was "spot-searched" by vehicle from various turnout points and bridges where Interstate 70 and state highways paralleled the river.

2. One domestic pikeminnow that was radiotagged and released at RM 223.0 near Parachute in late-June passed the fixed, telemetry station at Island Acres State Park (31 miles downstream) 37 hours later. Telemetry data indicated that the signal remained there for only about 2 minutes. This fish was not contacted during a boat search of the 15- and 18-mile reaches of the Colorado River in the Grand Valley the following week. This fish has not been contacted since. The continuous, rapid downstream movement and lack of subsequent contact leads us to suspect that this fish is dead.

3. The position of two other radiotagged pikeminnow, one wild and one domestic-reared, has been contacted in the same location over a 3-month period. The apparent lack of movement from this signal leads us to suspect these two fish are also dead.

4. One wild pikeminnow apparently moved downstream about 29 miles from its stocking site and moved into the Government Highline Canal in mid-July. It then moved downstream about 1.4 miles in the canal, where it's signal was picked up by the data logger located on the south bank of the Colorado River at Island Acres State Park. According to telemetry records, the fish spent about three days immediately downstream of the siphon before returning back through the siphon, continuing back upstream in the canal, and returning to the Colorado River. It was contacted 20 July at RM 195, 1.3 miles upstream from Government Highline Diversion Dam. This same fish along with one of it's wild counterparts, passed over the diversion dam and passed the Island Acres tracking station in mid-August. These two fish have not been contacted since.

5. During November tracking from a boat, only one wild radiotagged pikeminnow was confirmed alive. This fish was located at RM 194.8, 1.1 mile upstream from Government Highline Dam.

6. Contact was made with four wild and four domestic pikeminnow that were radiotagged. The fate of three pikeminnow, two domestic and one wild, are unknown and are suspected of being dead. The radio signal from two other radiotagged pikeminnow, one wild and one domestic, has never been acquired following release.

7. No tracking by boat was conducted between mid-November 2000 and mid-March 2001.

Radio tracking (2001)

1. Tracking by jet boat was conducted in mid-March 2001. The river reaches of the Upper Colorado River searched were: west of Rifle, CO (RM 236.0) to Beavertail Mountain (RM 194.7), Grand Valley Diversion Dam near Palisade, CO (RM 185.4), to Westwater Ranger Station, UT (RM 127.5), and the 2.3-miles of the Lower Gunnison River from the Redlands Diversion Dam to the Colorado River confluence. The river reach between Government Highline and Price Stubb dams is unnavigable by boat or raft during most periods of the year because of low flows. Moreover, access to the river to launch craft are almost nonexistent. Therefore, the reach between Government Highline Diversion Dam and Grand Valley Diversion Dam was "spot-checked" by vehicle from various turnout points and bridges where Interstate 70 and state highways paralleled the river.

   Contact was made with five radio signals. Four of these were from the '91-year class pikeminnow and one wild pikeminnow that had been radiotagged. Only one radiotagged fish was confirmed alive (i. e., movement upstream since last contact). This was a wild pikeminnow that had last been contacted in early-August 2000 immediately upstream of Government Highline Diversion Dam. It had moved 14 miles upstream and was contacted near Debeque, CO, at RM 207.5 in mid-March 2001. Two other '91-year class pikeminnow were contacted but they had moved downstream since their last contact. The radio signal of the remaining two pikeminnow that were contacted in March 2001 had not moved for several months. It is difficult to ascertain if these four pikeminnow are still alive or whether the radiotags have been expelled because there has been either no upstream movement following release or the radio signal has remained in the same location for several months.

2. Telemetry data from the fixed, land-based station at Island Acres continue to be downloaded about once monthly.

Water Temperature Data

1. Water temperature data were downloaded and retrieved from two data loggers at Una in mid-March. Two other temperature loggers located between Rifle and Silt

could not be reached via boat because river discharge was too low.

IV. Study Goals, Objectives, End Product:

Study Goals

Evaluate if translocated, wild and hatchery-reared sub-adult Colorado pikeminnow implanted with radiotags remain in the immediate vicinity of stocking, move upstream or downstream of the stocking site in the Upper Colorado River from Rifle to Palisade.

Evaluate if wild and hatchery-reared, sub-adult Colorado pikeminnow implanted with radiotags that have moved downstream over the Government Highline Diversion Dam will subsequently move upstream and use the fish passageway at the diversion dam.

Objectives

1. Determine the extent of up- and downstream movements of translocated Colorado pikeminnow following release upstream of the Government Highline Diversion Dam.

2. Determine if translocated, wild or hatchery-reared Colorado pikeminnow will remain and establish residency in stream reaches upstream of the Government Highline Diversion Dam. Document the duration that fish remain in upstream reaches.

3. Correlate spatial and temporal seasonal habitat use of radiotagged fish with water temperature upstream of Government Highline Diversion Dam.

4. Record and document any Colorado pikeminnow congregations at the time of spawning, particularly in stream reaches upstream of Government Highline Diversion Dam.

5. Determine if radiotagged Colorado pikeminnow move into the Government Highline Canal.

6. Determine if radiotagged fish that have moved downstream over Government Highline Diversion Dam will return upstream and use the fish passageway at this diversion dam.

Potential End Products

1. Information on how translocated pikeminnow behave following stocking, e.g., up- and downstream movement of translocated Colorado pikeminnow following release and the extent and duration that stocked, wild and hatchery-reared fish

remain in reaches of the Upper Colorado River upstream of Government Highline Diversion Dam.

2. Maximum upstream range of translocated Colorado pikeminnow following stocking.

3. Residency information on sub-adult Colorado pikeminnow translocated to new upstream reaches.

4. Information on water temperatures in stream reaches occupied by radiotagged Colorado pikeminnow.

5. Use of the fish passageway by radiotagged Colorado pikeminnow at the Government Highline Diversion Dam.

V. Study area: Upper Colorado River from approximately Rifle, Colorado, downstream to Loma boat landing (river miles 241-152); Government Highline Canal--diversion dam to Cameo siphon; Lower Gunnison River: Redlands Diversion Dam to Colorado/Gunnison River confluence (river mile 3.0 - 0.7).

VI. Study Methods/Approach:

Up to 20 wild, sub-adult (400-550 mm long) Colorado pikeminnow captured from downstream reaches of the Upper Colorado River (15- and 18-mile reaches), were to be implanted with LOTEK® radiotags, transported by distribution truck, and released upstream of the Government Highline Diversion Dam each during 2000 and 2001. During late-spring and early-summer 2000, several wild, sub-adult Colorado pikeminnow were captured with trammel nets ('scare and snare') from the 15- and 18-mile reaches. Because many of the pikeminnow captured were much larger than 550 mm, only five were implanted with LOTEK® radio transmitters, translocated upstream, and stocked in the Upper Colorado River. Radiotagged, wild pikeminnow were stocked in late-June. Two of these wild pikeminnow were stocked at the Parachute Bridge (RM 223.0) and three other pikeminnow were stocked further upstream at RM 227.6. In addition, 65, sub-adult, hatchery-reared 1991 year-class Colorado pikeminnow were PIT tagged and stocked in the Upper Colorado River near Parachute in late-June 2000. Five of these hatchery-reared pikeminnow were implanted with LOTEK® radio transmitters.

A digitally encoded telemetry system (LOTEK®) was used to follow movements of radiotagged Colorado pikeminnow. Movements of radiotagged Colorado pikeminnow were also monitored from boats to determine if fish would occupy the reach between Rifle and the Government Highline Diversion Dam or move downstream over the dam. The movements of fish that move downstream over this diversion dam was recorded using a land-based tracking station that was deployed 1.4 miles downstream from Government Highline Diversion Dam. The land-based station consisted of a data-logging receiver and two, multi-filament Yagi antennae arrays that constantly monitored

and recorded signals from radiotagged fish. Since the land-based, data-logging receiver was powered by a photovoltaic panel equipped with a solar battery that stored electricity, the data logger provided continuous information on the movement of pikeminnow that had passed over the diversion dam.

If radiotagged fish moved downstream over the Government Highline Diversion Dam, this technology will allow researchers to determine exactly when they pass over the diversion dam and if tracking the movements of these fish from boats in reaches downstream of the diversion dam should be initiated. One other fixed tracking station was deployed 23 March 2001 between Price-Stubb and Grand Valley Diversion dams near Palisade, CO. One other fixed tracking station will be deployed in mid-April 2001 next to the Government Highline Canal west of Cameo and immediately before tunnel number 3 and the siphon which directs water to the Orchard Mesa Irrigation District canal. This telemetry station will provide continuous surveillance of radiotagged pikeminnow that enter the canal at the diversion dam and travel downstream in the canal. Aerial surveillance from fixed-wing aircraft may be used to locate radiotagged fish that cannot be contacted on the ground.

Water temperature recorders were deployed in the Upper Colorado River at the Una Bridge (river mile 216.6), Rulison Bridge (229.8), and between Rifle and Silt. These recorders are being maintained and serviced by the Fish and Wildlife Service. Water temperatures recorded at these three sites and at the USGS gaging station at Cameo (river mile 199.6) will be used to associate water temperatures with seasonal locations of radiotagged Colorado pikeminnow upstream of Government Highline Diversion Dam.

2001 Study Plans

Up to 20 sub-adult (400-550 mm) Colorado pikeminnow will be captured from the 15- and 18-miles reaches of the Upper Colorado River during runoff flow stage. This effort could start as early as late-April and continue through early-June or until the target number of 20 pikeminnow are captured. Sampling will be with trammel nets. Pikeminnow will then be radiotagged, translocated, and stocked in the Upper Colorado River between Parachute and Rulison and their movements followed by tracking.

VII. Task Description and Schedule

Task Description

Task 1: Capture, radiotag, and transport fish to stream reaches upstream of the Government Highline Diversion Dam; deploy fixed tracking stations

Task 2: Monitor movements of radiotagged fish

Task 3: Deploy and maintain water temperature data loggers

Task 4: a) Prepare annual progress report; b) prepare draft and final report

Task Schedule

Task 1: 4/2000-6/2000; 4/2001-6/2001

Task 2: 5/2000-11/2000; 5/2001-11/2001

Task 3: 4/2000-12/2000; 1/2001-9/2001; 10/2001-11/2001

Task 4: a) 11/2000-12/2000; 11/2001-12/2001; b) 1/2002-8/2002

VIII. FY-2002 Work

Deliverables/Due Dates:

Draft Report to Coordinator	8/01/2002
Draft Final Report to peer review	9/01/2002
Draft Final Report to Biology Committee	11/01/2002
Final Report completed	1/15/2003

Tasks 2 & 3:	
Labor	
Project Biologist	$ 1,500
Task 4:	
Project Leader (1 week)	$ 1,500
Project Biologist (7 weeks)	$ 9,000
Other (Printing and distribution of report)	$ 1,000
Total:	$ 13,000

IX. Budget Summary

FY-2002	$ 13,000
Total:	$ 13,000

X. Reviewers:

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XI. References

Anderson, R. 1997. An evaluation of fish community structure and habitat potential for Colorado squawfish [pikeminnow] and razorback sucker in the unoccupied reach (Palisade to Rifle) of the Colorado River, 1993-1995. Final Report. Colorado Division of Wildlife, Ft. Collins, CO 73 pp.

Burdick, B. D. 1992. A plan to evaluate stocking to augment or restore razorback suckers in the upper Colorado River. U. S. Fish and Wildlife Service, Colorado River Fishery Project, Grand Junction, CO 56 pp.

Burdick, B. D., R. S. Wydoski, and C. W. McAda. 1995. Stocking plan for razorback sucker in the Upper Colorado and Gunnison rivers. Final report prepared for the Recovery Implementation Program for Endangered Fishes of the Upper Colorado River Basin. U. S. Fish and Wildlife Service, Denver, CO. 13 pp.

Burdick, B. D., and R. B. Bonar. 1997. Experimental stocking of adult razorback sucker in the Upper Colorado and Gunnison rivers. Final report prepared for the Recovery Implementation Program for Endangered Fishes of the Upper Colorado River Basin. U. S. Fish and Wildlife Service, Colorado River Fishery Project, Grand Junction, CO. 28 pp. + Appendices.

Carlson, C. A., and S. P. Platania. 1984. An ichthyofaunal survey over a seven-month period of Plateau Creek: A Colorado River tributary. IRFP-6-84/MM. Prepared for Colorado State Department of Highways, Denver, CO.

Kidd, G. 1974. Preliminary report on endangered and threatened endemic warmwater species of fish in western Colorado rivers. R30R11, Colorado Division of Wildlife.

Nesler, T. P. 1998. Five-year stocking plan for endangered Colorado River fish species in Colorado. Final report. Colorado Division of Wildlife, Denver, CO 34 pp.

Osmundson, D. O. and five co-authors. 1998. Dispersal patterns of subadult and adult Colorado squawfish in the Upper Colorado River. Transactions of the American Fisheries Society 127:943-956.

Valdez, R. A., P. Mangan, R. Smith, and B. Nilson. 1982. Upper Colorado River Investigation (Rifle, Colorado to Lake Powell, Utah). Pages 101-279 in W. H. Miller et al. editors. Colorado River Fishery Project Final Report; Part Two, Field Studies. U. S. Fish and Wildlife Service and Bureau of Reclamation. Salt Lake City, UT.

Wick, E. J., and J. A. Hawkins. 1983. Plateau Creek. Colorado Division of Wildlife Report. Denver, CO.

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